

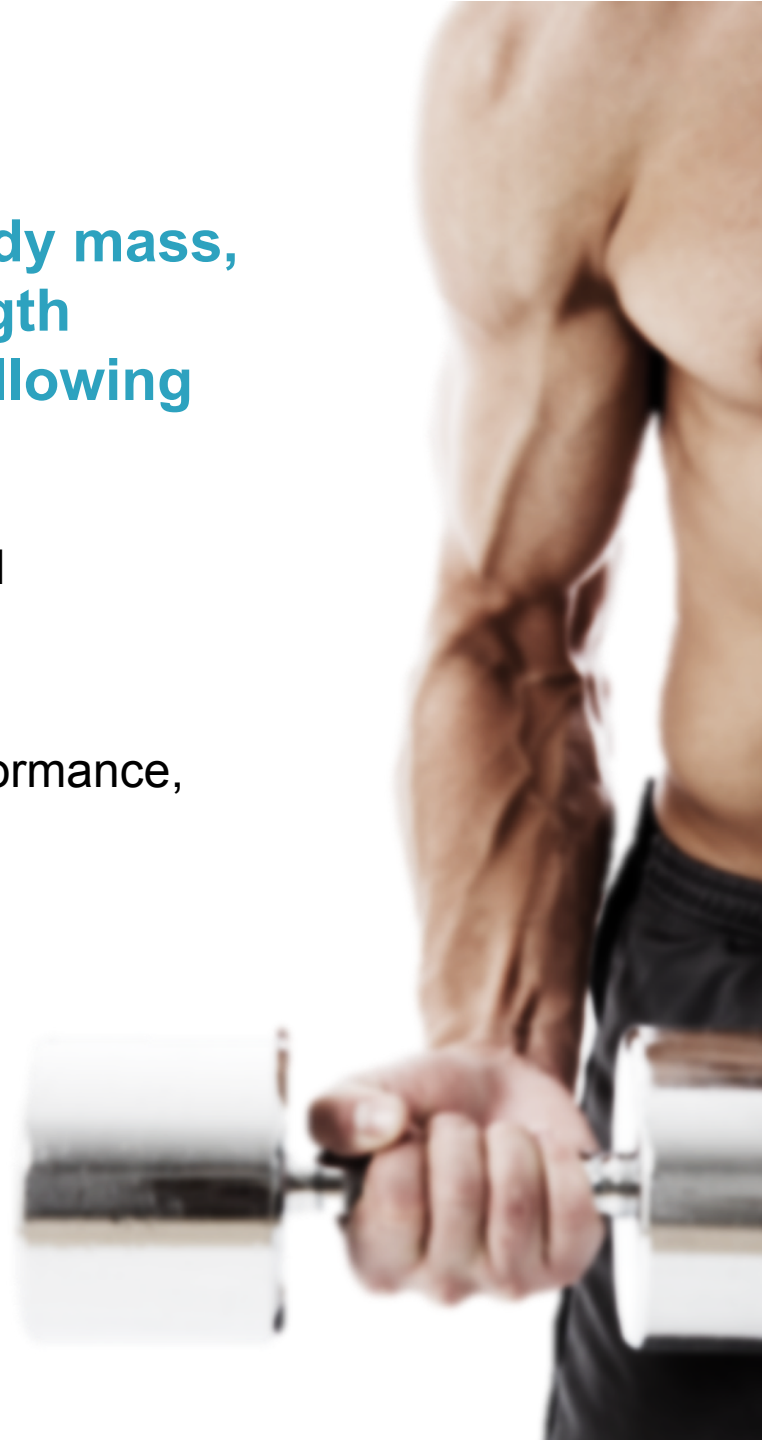
# Rice protein isolate increases lean body mass, muscle hypertrophy, power and strength comparable to whey protein isolate following resistance exercise

**A double-blind, placebo-controlled clinical trial**

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The University of Tampa

Submitted for publication



## STUDY GOALS



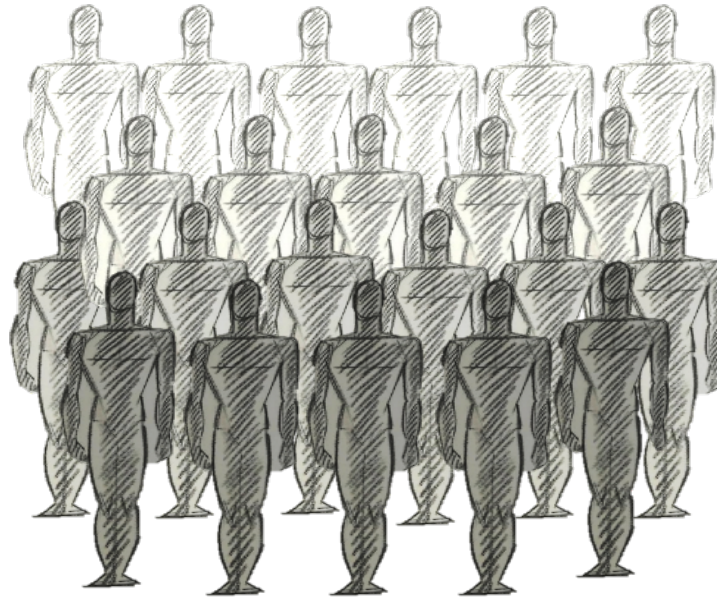
**To determine how rice protein supplementation compares to whey protein on**

- **Acute Recovery following high volume resistance exercise**
- **Changes in body composition (Lean Body Mass, Fat Mass, Muscle Hypertrophy)**
- **Changes in Power and Strength**

**following an 8-week resistance exercise program.**



## STUDY SUBJECTS



Age:  $21.3 \pm 1.9$  years  
Weight:  $76.08 \pm 5.6$  kg  
Height:  $177.8 \pm 12.3$  cm

- **24 healthy, resistance-trained males (min. of 1 year of prior training)**
- **Randomly divided in 2 groups and assigned to ingest whey protein isolate (WPI) or rice protein isolate (RPI) supplement post-workout.**

## STUDY MATERIALS

- 48g of RPI or WPI (isonitrogenous and isoenergetic) post-exercise

| Amino Acid<br>[mg/g of Protein] | WHEY<br>PROTEIN<br>ISOLATE | RICE<br>PROTEIN<br>ISOLATE |
|---------------------------------|----------------------------|----------------------------|
| Alanine                         | 54                         | 54                         |
| Arginine                        | 23                         | 77                         |
| Aspartic Acid                   | 118                        | 87                         |
| Cystine                         | 25                         | 21                         |
| Glutamic Acid                   | 191                        | 174                        |
| Glycine                         | 19                         | 43                         |
| Histidine                       | 18                         | 22                         |
| Isoleucine                      | 70                         | 41                         |
| Leucine                         | 115                        | 80                         |
| Lysine                          | 101                        | 31                         |
| Methionine                      | 23                         | 28                         |
| Phenylalanine                   | 33                         | 53                         |
| Proline                         | 64                         | 45                         |
| Serine                          | 52                         | 49                         |
| Threonine                       | 76                         | 35                         |
| Tryptophan                      | 22                         | 14                         |
| Tyrosine                        | 31                         | 47                         |
| Valine                          | 64                         | 58                         |



**Growing NATURELS**  
100% Essential Amino Acids  
• Dairy, Soy and Gluten Free  
• Deliciously Smooth  
• Sustainable Protein  
• Hypoallergenic

**ORGANIC RAW RICE PROTEIN**  
WHOLE GRAIN BROWN RICE ISOLATE POWDER  
Chocolate Power

**Nutrition Facts**  
Serving Size: 1 Scoop (34g)  
Servings per container: Approx. 14

| Amount Per Serving    | Calories 120 | % DV*        |
|-----------------------|--------------|--------------|
| Total Fat 0g          |              | 0%           |
| Saturated Fat 0g      |              | 0%           |
| Trans Fat 0g          |              | 0%           |
| Cholesterol 0mg       |              | 0%           |
| Sodium 40mg           |              | 2%           |
| Total Carbohydrate 5g |              | 2%           |
| Dietary Fiber 1g      |              | 4%           |
| Sugars 2g             |              |              |
| Protein 24g           |              | 48%          |
| Vitamin A 0%          |              | Vitamin C 0% |
| Calcium 0%            |              | Iron 15%     |

\*Percent Daily Values (DV) are based on a diet of 2,000 calories a day. Your daily values may be higher or lower depending on your calorie needs.

**NATURALLY OCCURRING AMINO ACID PROFILE**

| Amino Acids   | Per 100 Grams (%) | Per Serving |
|---------------|-------------------|-------------|
| Alanine       | 4.9%              | 1176 mg     |
| Arginine      | 6.82%             | 1637 mg     |
| Aspartic Acid | 9.1%              | 2184 mg     |
| Cysteine      | 2.4%              | 576 mg      |
| Glutamic Acid | 17.21%            | 4131 mg     |
| Glycine       | 3.15%             | 756 mg      |
| Histidine     | 2.54%             | 610 mg      |
| Isoleucine    | 5.83%             | 1400 mg     |
| Leucine       | 9.1%              | 2184 mg     |
| Lysine        | 8.12%             | 1950 mg     |
| Methionine    | 2.3%              | 552 mg      |
| Phenylalanine | 4.38%             | 1052 mg     |
| Proline       | 6.1%              | 1464 mg     |
| Serine        | 4.92%             | 1171 mg     |
| Threonine     | 4.75%             | 1140 mg     |
| Tryptophan    | 1.56%             | 375 mg      |
| Tyrosine      | 4.1%              | 984 mg      |
| Valine        | 6.02%             | 1444 mg     |

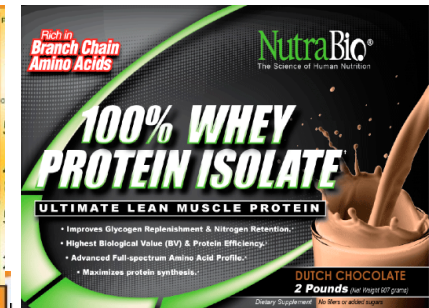
\*Essential Amino Acids your body does not produce on its own.  
\*Branched Chain Amino Acids (BCAA) for supporting muscle. All values are approximate.  
Our rice protein isolate has a complete amino acid profile containing all necessary essential and non-essential amino acids in a desired proportion.

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**INGREDIENTS:** ORGANIC ORYZANOL™, ORGANIC SPROUTED WHOLE GRAIN BROWN RICE, NUTRITION DATE, ORGANIC COCOA, ORGANIC ORYZA™, ORGANIC SPROUTED WHOLE GRAIN BROWN RICE (RPI), ORGANIC FLAVOR, ORGANIC CARAMEL, ORGANIC GUAR GUM, ORGANIC GUAR GUM, ORGANIC STEVIA, SLS (SLS), Organic Rice not derived from corn or grain.

**Certified Organic by QAI**  
**Gluten Free**



**Rich in Branch Chain Amino Acids**

**NutraBio®**  
The Science of Human Nutrition

**100% WHEY PROTEIN ISOLATE**  
ULTIMATE LEAN MUSCLE PROTEIN

- Improves Glycogen Replenishment & Nitrogen Retention
- Highest Biological Value (BV) & Protein Efficiency
- Advanced Full-spectrum Amino Acid Profile
- Maximizes protein synthesis

**DUTCH CHOCOLATE**  
2 Pounds (Net Weight 675g)

**Nutritional Facts**  
Serving size: 1 scoop (47.5 lbs. (28.9 grams)  
Servings per container: 31

| Amount Per Serving    | Calories 106 | % Daily Value * |
|-----------------------|--------------|-----------------|
| Total Fat <1g         |              | 0%              |
| Saturated Fat <1g     |              | 0%              |
| Trans Fat 0g          |              | 0%              |
| Cholesterol <1mg      |              | 0%              |
| Sodium 75mg           |              | 3%              |
| Total Carbohydrate 2g |              | <1%             |
| Dietary Fiber <1g     |              | 0%              |
| Sugars <1g            |              | 0%              |
| Potassium 134mg       |              | 4%              |
| Protein 25g           |              | 50%             |

\*Percent Daily Values are based on a diet of 2,000 calories a day. Your daily values may be higher or lower depending on your calorie needs.

**Amino Acid Profile**  
per 28g of protein - 1 scoop

|                        |         |
|------------------------|---------|
| Alanine                | 981 mg  |
| Arginine               | 819 mg  |
| Aspartic acid          | 2519 mg |
| Cysteine               | 478 mg  |
| Glutamine & Precursors | 4477 mg |
| Glycine                | 426 mg  |
| Histidine              | 415 mg  |
| Isoleucine             | 1638 mg |
| Leucine                | 2594 mg |
| Lysine                 | 2207 mg |
| Methionine             | 497 mg  |
| Phenylalanine          | 720 mg  |
| Proline                | 1346 mg |
| Serine                 | 1182 mg |
| Threonine              | 1678 mg |
| Tryptophan             | 385 mg  |
| Tyrosine               | 669 mg  |
| Valine                 | 1502 mg |

\*These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure or prevent any disease.

**INGREDIENTS:** 100% whey protein isolate (non-denatured), natural cocoa, natural & artificial flavor, gum blend (cellulose gum, xanthan gum, carboxymethyl cellulose), **ALLERGENS:** milk and soy (less than 2%).

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Participant diets were controlled for by a Registered Dietitian (RD), with specific and exact proportions of protein, carbs and fat.

# WORKOUT PROGRAM



- **Full body workouts**
- **3-times per week, 8-weeks**
- **Alternated**
  - **hypertrophy (3 sets of 8-12 RM loads and 60 seconds rest)**
  - **strength (3-5 sets of 1-5 RM loads, with 3-5 minutes rest)**

| Monday                       | Tuesday | Wednesday                  | Thursday | Friday                 |
|------------------------------|---------|----------------------------|----------|------------------------|
| Hypertrophy (leg & chest)    |         | Hypertrophy (back & delts) |          | Strength               |
| Leg Press                    |         | Pull-ups                   |          | Leg Press              |
| Leg Curl                     |         | 90° Bent Rows              |          | Bench Press            |
| Leg Extension                |         | Shrugs                     |          | Leg Extension          |
| Hyperextension               |         | Shoulder Press             |          | Close Grip Bench Press |
| Bench Press                  |         | Lateral Raise              |          |                        |
| Dumbbell Incline Bench Press |         | Reverse Laterals           |          |                        |
| Close Grip Bench Press       |         | Bicep curls                |          |                        |
| Skullcrushers                |         |                            |          |                        |

# WORKOUT PROGRAM



## Bench Press



## Leg Press



## Military Press



# WORKOUT PROGRAM



## Pull-ups



## Bent Over Rows



## Barbell Curls & Extensions





## RECOVERY: METHOD

- **Baseline measurements (before workout)**

### **Soreness**

- 0 = no soreness
- 10 = worst soreness

### **Perceived Recovery**

- 0 = very poorly recovered
- 10 = very highly recovered

### **Perceived Readiness to Train**

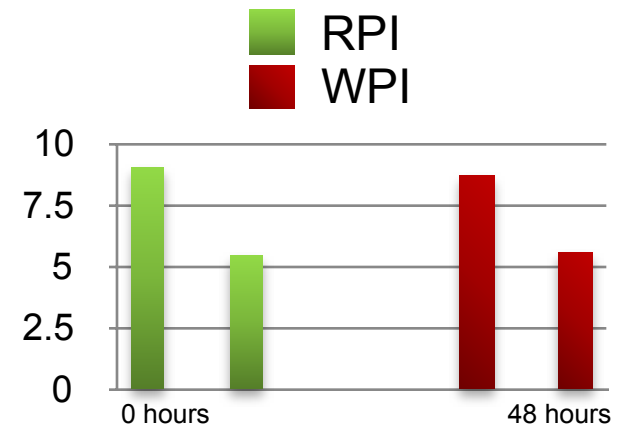
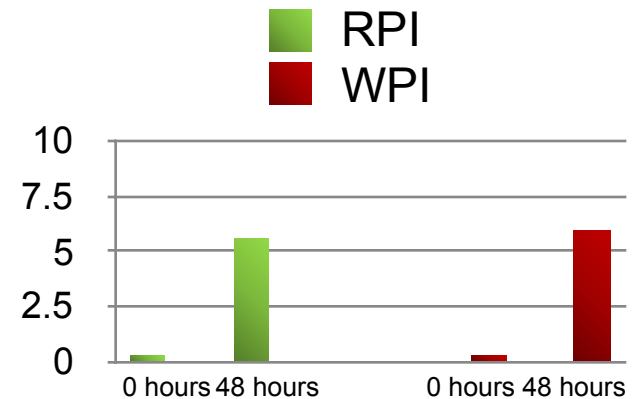
- 0 = Not ready to train
- 10 = Most ready to train

- **Second measurement: 48 hours after first workout (time of peak soreness)**



## RECOVERY: RESULTS

- Soreness increased
- Perceived Recovery and Readiness to Train decreased
- NO difference between rice and whey.
- Rice Protein Isolate is as effective as Whey Protein Isolate in regards to recovery after resistance exercise.

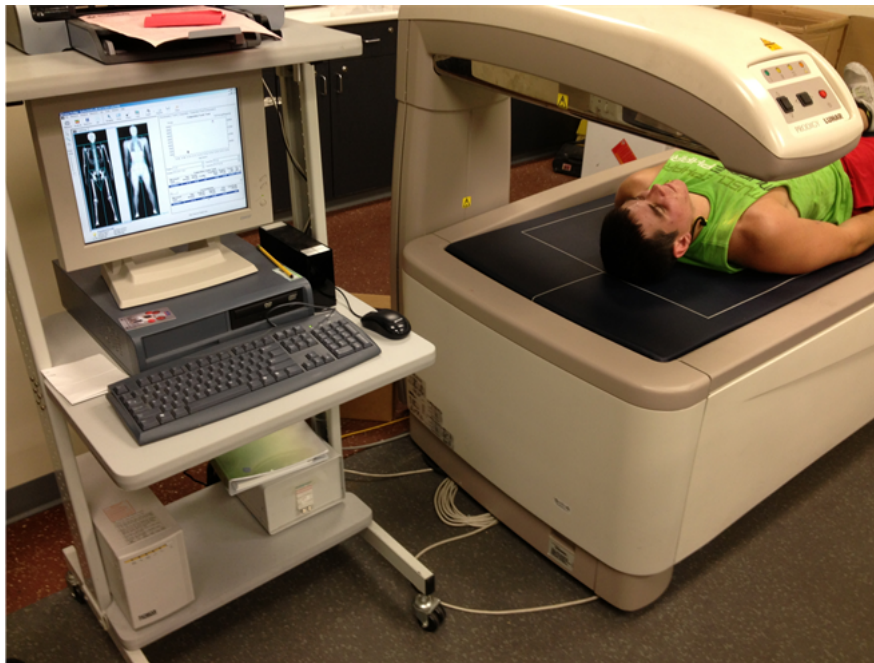




## BODY COMPOSITION: TEST METHODS

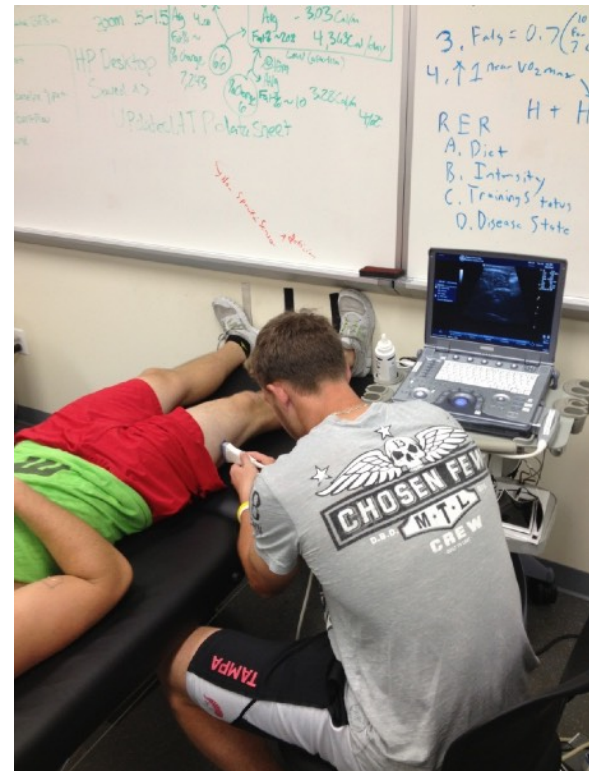
### DEXA

Lean Body Mass, Fat Mass, Muscle Mass



### Ultrasonography

Measuring Muscle Thickness



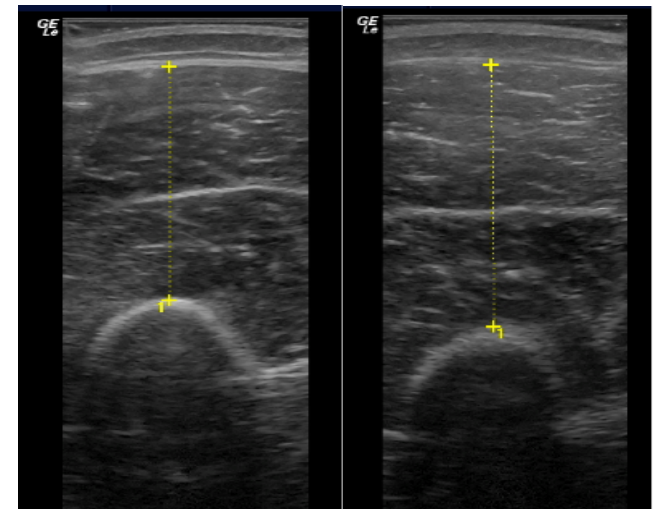
# BODY COMPOSITION: TEST METHODS



## Biceps brachii



## Quadriceps



1 L 4.60 cm

Week 0

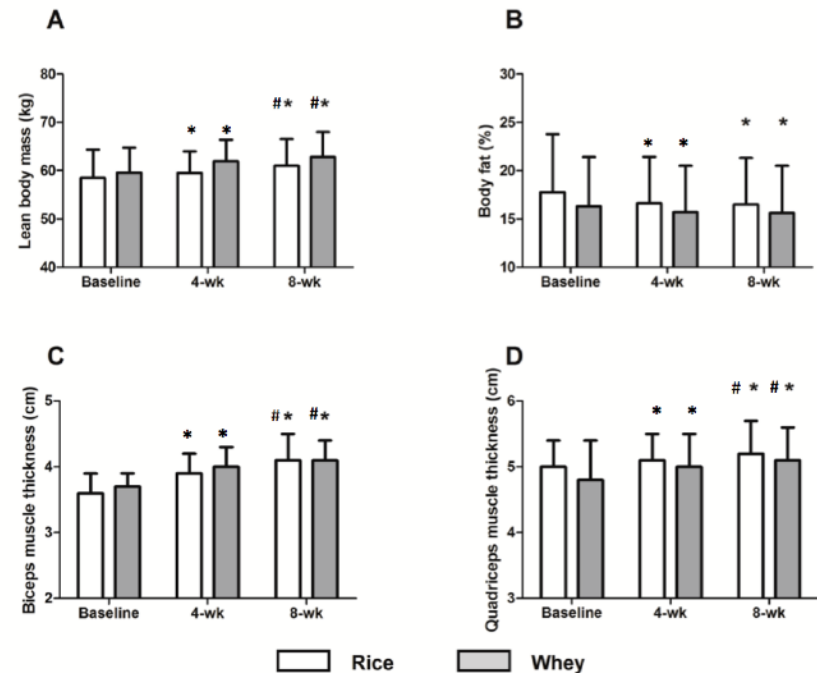
1 L 5.16 cm

Week 4



## BODY COMPOSITION: RESULTS

- Lean Body Mass increased significantly (6-7 lbs, ~5%)
  - Fat Mass decreased significantly (~5.5%)
  - Biceps Thickness increased significantly (~14%)
  - Quadriceps Thickness increased significantly (~5%)
- 
- Significant result in as little as 4-weeks
  - NO difference between rice and whey.



# STRENGTH MEASUREMENTS



## Bench Press



## Leg Press



## TOTAL STRENGTH

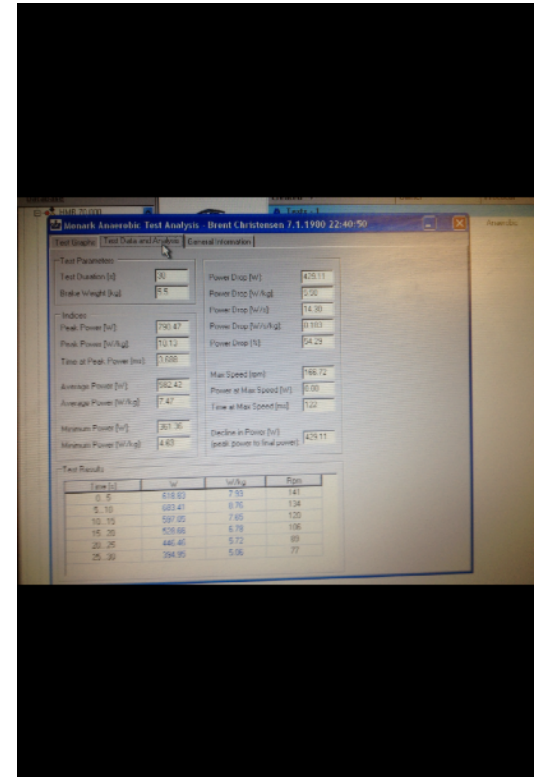
= 1-RM (one repetition maximum) Bench Press  
+ 1-RM Leg Press

# POWER MEASUREMENT



## Wingate Peak Power

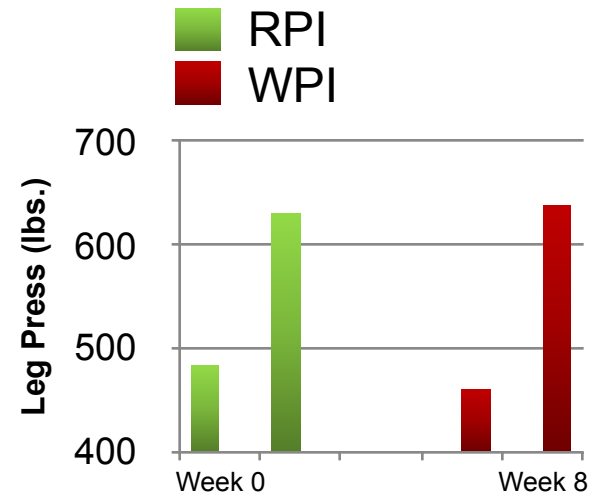
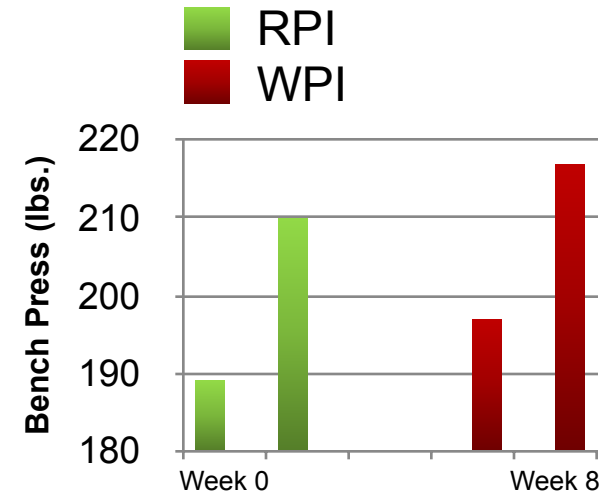
Power output was determined during a maximal Wingate sprint on a monarch cycle ergometer apparatus





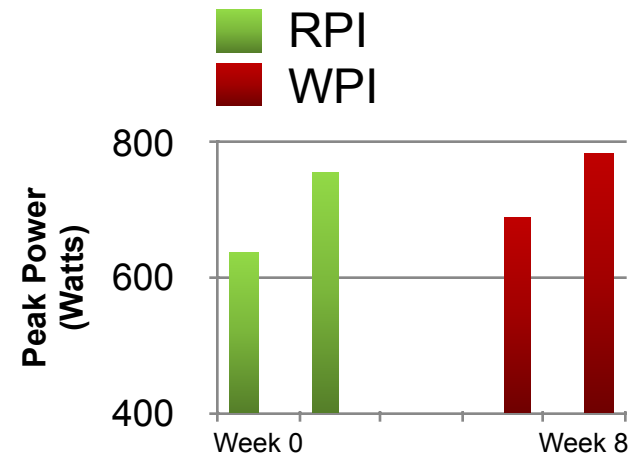
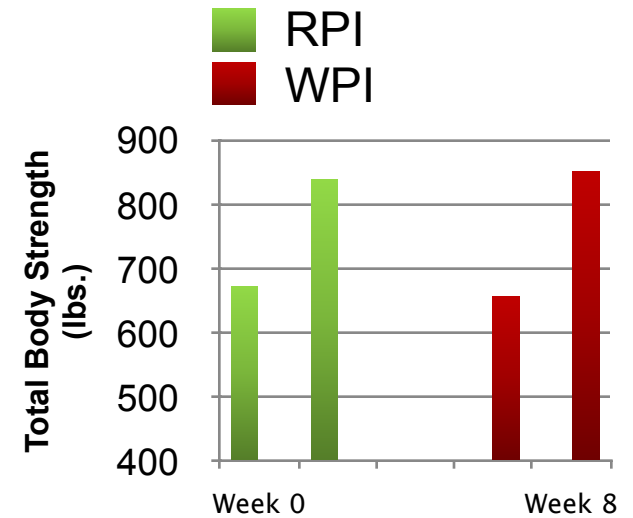
## STRENGTH & POWER RESULTS

- **Bench Press increased significantly (~20 lbs, ~11%)**
- **Leg Press increased significantly (~160 lbs, ~34%)**
- **NO difference between rice and whey**



## STRENGTH & POWER RESULTS

- Total Body Strength increased significantly (~180 lbs, ~28%)
- Wingate Peak Power increased significantly (~16%)
- NO difference between rice and whey



## CONCLUSION



### **Rice protein isolate (RPI) administration post resistance exercise**

- **decreases fat-mass**
- **increases lean body mass**
- **increases skeletal muscle hypertrophy**
- **increases power**
- **increases strength**

**comparable to whey protein isolate (WPI).**